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ABSTRACT

Using self-instructional strategy training procedures, three sixth-grade learning disabled students were taught a series of self-directed prompts designed to facilitate the generation, framing, and planning of written compositions. The eight-step instructional procedure included pretraining, review of baseline performance level, description of the three-step composition strategy (think, plan, write), modeling, mastery of strategy steps, controlled practice, independent performance, and generalization. Changes in writing performance were measured by analyzing students' essays in terms of functional and nonfunctional elements, number of words written, cohesiveness, and overall quality. Following training, students wrote essays that were judged to be qualitatively better and that generally included all of the components (premise, reasons, and conclusion) central to a complete argument. Effects were maintained over time and transferred to the students' special education classroom. Associated changes in affect were reflected in the fact that two students became more confident in their ability to write an essay. Some evidence for transfer of training to a second genre (story writing) was also obtained. (JW)

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Improving Learning Disabled Students' Skills at Generating Essays: Self-Instructional Strategy Training

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Paper presented at the 1988 Annual Meeting of the American Educational Research Association, New Orleans.

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Learning disabled (LD) students have been characterized as having severe and persistent writing problems (Graham & MacArthur, 1987a). In examining the available literature, Graham and Harris (in press) noted that these students have considerable difficulty executing and monitoring many of the basic cognitive processes central to effective writing. Of particular interest to this study are LD students' difficulty in generating, framing, and planning text. In terms of generating content, LD students produce written products that are inordinately short (cf. Deno, Marston, & Mirkin, 1982; Nodine, Barenbaum, & Newcomer, 1985). While it is tempting to attribute their content generation problems to a lack of knowledge about the topics they are asked to write about, recent evidence suggests that LD students' problems are, in part, due to difficulties in accessing the knowledge they do have. Graham and Harris (1987a) found that simply encouraging LD students to "write more" doubled to tripled their output. MacArthur and Graham (1987) reported that these students may possess more knowledge than is reflected in their written products; LD students' dictated compositions were three to four times longer than papers written via handwriting or word processing. Englert and her colleagues (Englert & Raphael, in press; Englert, Raphael, & Anderson, 1986; Thomas, Englert, & Gregg, 1987) have argued that LD students have content generation problems because they are not particularly successful in employing strategies for self-directed memory search. They found that LD students had difficulty in retrieving ideas as evidenced by their failure to produce multiple statements about familiar subjects (Thomas et al., 1987).

In addition to having difficulties in generating enough text, the content generated by LD students often falls short of adequately meeting the purpose, conventions, and features of the genre under consideration (Graham & Harris, in press). In order to meet the demands inherent in a particular writing task, good writers commonly develop an ongoing frame for their text by using their knowledge of genre patterns or other discourse schema to decide what information to include in their paper and to regulate what will go where (Englert & Raphael, in press; Scardamalia & Bereiter, 1986). While LD students appear to be somewhat successful in using knowledge of genre patterns to develop and frame text as evidenced by their ability to generate compositions that contain at least some of the elements common to the type of writing they are assigned (cf. Graham & Harris, 1987a, 1987b; Nodine et al., 1986; Thomas et al., 1987), their knowledge is either incomplete or they are not able to gain conscious access to all of the structural knowledge they do possess. Examinations of LD students' compositions reveal that they frequently fail to include critical elements such as how a story ends (Graham & Harris, 1987b; Nodine et al., 1986) or the premise and conclusion to their essays (Graham & Harris, 1987a). Furthermore, a considerable amount of irrelevant or nonfunctional information is often generated (Graham & Harris, 1987a). Thus, LD students ability to use genre specific knowledge to retrieve and organize relevant information appears to be limited.

While little is known about how LD students plan their compositions, it does not appear that much planning is done in advance of writing. MacArthur and Graham (1987) found that LD students averaged less than one minute of time between the examiner's instructions to "plan their papers in advance of writing" and the physical start of writing, typing, or dictation. In addition, Thomas et

al. (1987) reported that the LD students in their study approached writing by converting the assigned writing task into a question-answering task; telling whatever came to mind and then terminating their responses or answering in short choppy phrases. A student using a planning strategy of this nature will direct little attention to the needs of the reader, the constraints imposed by the topic, and the whole-text organization of their written composition.

In the present study, LD students were taught a strategy designed to facilitate the generation, framing, and planning of text; areas demonstrated by previous research to be critical to effective writing (see Hayes & Flower, 1986) and deficits for LD students. Specifically, students were taught a series of self-directed prompts that required them to consider their audience and reasons for writing, develop a plan for what they intended to say using knowledge of discourse schemas or frames to generate and organize writing notes, evaluate possible content by considering its impact on the reader, and continue the process of content generation and planning during the actual act of writing. Students were taught to use the strategy when writing argumentative essays.

The strategy was taught using the "self-instructional strategy training" procedures recommended by Graham and Harris (Graham & Harris, 1987c, in press; Graham, Harris, & Sawyer, 1987; Harris Graham, 1988). Self-instructional strategy training involves interactive learning between teacher and students; the teacher initially provides strong external support to students with ultimate responsibility for recruiting, applying, and monitoring the target strategy(s) gradually transferred to the student. Explicit explanations regarding the rationale and the potential benefits of the strategy are discussed, and procedures for promoting maintenance and generalization are embedded throughout training. Students also learn to apply a variety of self-statements designed to support and regulate the smooth execution of the strategy(s). To date, self-instructional stategies training has been successfully used to teach students strategies for writing stories (Graham & Harris, 1987b; Harris & Graham, 1985) and revising essays (Graham & MacArthur, 1987b).

Following recommendations made by Harris (1985), multiple methods were used to evaluate the impact of the strategy and the corresponding training procedures. First, changes in writing performance were measured by analyzing students' essays in terms of functional and nonfunctional elements, number of words written, cohesiveness, and overall quality. Second, changes in affect were assessed by examining subjects' judgements of their ability to write and revise a "good essay", a measure of self-efficacy. Third, generalization to both a new setting and a different writing genre (story production) as well as maintenance of effects over time were appraised. Fourth, evidence was collected to verify that subjects actually used the inculcated strategy. Fifth, the social validity of the strategy and training procedures were assessed with both subjects and their teacher.

Method

Subjects

Subjects were three sixth grade LD students (Elaine, Morgane, and Arthur) receiving resource room services in a suburban elementary school in the northeastern United States. Subjects were selected on the basis of the following stepwise criteria: identification as LD by the school district, IQ

scores between 85-115 on an individually administered intelligence test (WISC-R), achievement at least two years below age/grade level in one or more academic areas, absence of any other handicapping condition, and interviews with teachers indicating that significant composition problems were evident. In addition, the Vocabulary and Thematic Maturity subtests from the Test of Written Language (TOWL) were administered to each subject. The standard scores for these subtests have a mean of 10 and a standard deviation of three (Hammill & Larsen, 1983).

The first subject, Elaine, was 12-3 at the start of the study and had previously failed the fifth grade. Her full scale score on the WISC-R was 101 and her math, writing, and knowledge achievement scores on the Woodcock-Johnson Psychoeducational Battery (WJ) were at least three years below her age level. Elaine's standard scores on the Vocabulary and Thematic Maturity subtests of the TOWL were 9 and 8, respectively. Morgane, the second subject, was 12-3 and had previously failed the first grade. Her score on the Slosson Intelligence Test was 89 and her reading achievement score on the WJ was two years below her age level. Morgane's standard scores on the Vocabulary and Thematic Maturity subtest of the TOWL were 9 and 6, respectively. The third subject, Arthur, was 12-7 and had failed the third grade. His full scale score on the WISC-R was 99 and his reading and math achievement scores on the WJ were two years below his age level. His standard scores on the Vocabulary and Thematic Maturity subtests of the TOWL were 9 and 6, respectively.

General Procedures

A graduate student majoring in special education served as the instructor. Prior to the start of the study, the instructor received training and practice implementing the experimental procedures. A notebook with detailed lesson plans containing a step-by-step description of the instructional procedures was provided and the instructor was told to check each step of the daily lesson plan as it was completed. The instructor was also directed to keep a daily log recording: (a) student and teacher comments and (b) any pertinent observations on the learning and use of the strategy.

Before the study began, 19 essay topics were generated and the subjects' resource room teacher was asked to evaluate each topic in terms of its appropriateness. On the basis of the teachers' evaluations, two topics were dropped. Examples of the essay topics included: "Do you think children should be allowed to have their own pets?", "Should children be allowed to play video games?", and "Should parents give their children money for having good grades on their report cards?" The essay topics were randomly ordered and preassigned for each of the planned essay probes.

Similarly, seven black and white pictures were selected and evaluated. Pictures were selected so that they would be of interest to elementary-age children and fairly easy to write about. None of the selected pictures were evaluated negatively by the resource room teacher. Examples of the pictures included: (a) a boy walking across a field, (b) a woman standing next to an airplane, and (c) an Indian on a horse. Pictures were randomly ordered and preassigned for each of the story writing probes.

Each student met with the instructor in a quiet room for approximately 45 minutes three days a week. On days in which the subject's assignment was to

write either an essay or story in response to a preassigned topic or picture, the following instructions were given:

> Look carefully at (the sentence on this card/this picture) and make up a good (essay/story) to go with it.

For essay writing probes, the examiner read the topic sentence to the student. In addition, at the start of each writing session, the subject was given two pieces of paper and two pencils. The examiner did not provide assistance or feedback to the subject on the quality of their essay/story. However, if the student was clearly off task, the examiner prompted her/him to keep working.

The essays and stories produced by each subject were shared with a classmate assigned by the student's teacher. This provided a real audience and purpose for writing.

Instructional Procedures

The instructional training regime was based on guidelines for designing and implementing self-instructional strategy training procedures provided by Graham and Harris (Graham & Harris, 1987c, in press; Graham, Harris, & Sawyer, 1987, Harris & Graham, 1988). Training was criterion based and a student did not progress to the next level of training until the previous step had been mastered. The instructional steps were as follows:

Step 1: Pretraining

Pretraining focused on defining and generating the components of a good essay. This process was facilitated by the use of a small chart which provided a mnemonic (TREE) for four prompts: Note Topic Sentence, Note Reasons, Examine Reasons (Will my reader buy this?), and Note Ending. The mnemonic and its prompts correspond to the general framework for arguments which consist of premise, reasons and data to support premise, and conclusion. After discussing the meaning of each of the prompts, the student practiced until the mnemonic and the meaning of each of the steps could be recited from memory. The student also assisted the instructor in generating a premise, reason, and a conclusion.

Step 2: Review Current Performance Level

The student and instructor first discussed the student's baseline performance on writing essays. This included an examination of the inclusion of the basic components as well as the quality of each component. The instructor and student then discussed the goal of training (to write better essays), why this is important, and how the inclusion of the basic components could improve an essay. Each student was also asked to write and sign a goal indicating her/his commitment to learn a strategy for writing better essays.

Step 3: Describe the Composition Strategy

A small chart was used to introduce and discuss a three-step strategy for writing good essays. The three steps were: 1) Think, who will read this, and why am I writing this? 2) Plan what to say using TREE (note topic sentence, note reasons, examine reasons, note ending). 3) Write and say more. The strategy requires the writer to consider their reasons for writing the composition, evaluate writing content by considering the potential reader(s) of

their text, generate notes for their compositions that correspond to the basic components of a good essay, and to continue the generation of content and planning during the actual writing of the text. The instructor described why and how each step of the strategy was used in planning and writing an essay.

Step 4: Model the Strategy

The three-step strategy chart was placed in front of the student and the instructor modeled the use of the strategy by writing an essay while "thinking out loud." The instructor modeled four additional types of self-instructions during the development and writing of the essay: problem definition, planning, self-evaluation, and self-reinforcement. Following modeling, the instructor and student discussed the importance of what we say to ourselves while we work. Students then generated and recorded on a small chart their own examples of the four types of self-instructions.

Step 5: Mastery of Strategy Steps

Students were required to practice the three-step strategy and TREE until memorized. The student was allowed to paraphrase as long as meaning remained intact. Additionally, students reviewed the self-instructions they previously generated and recorded.

Step 6: Controlled Practice

The instructor and student conjointly composed an essay using the three-step strategy and self-instructional statements. The strategy chart as well as the student-generated self-instruction list were available as prompts. Although the instructor directed and monitored the process, she did not write the essay.

Step 7: Independent Performance

The student independently composed essays using the three-step strategy and self-instructional statements. Positive and corrective feedback was provided as needed and transition to covert self-instruction was encouraged. The strategy chart and self-statements were initially available as prompts, if necessary, but then faded. Independent practice was continued until the student demonstrated proficiency in the use of the strategy.

Step 8: Generalization

Following mastery of the strategy, the student and instructor discussed how the three-step procedures might be adapted (e.g., eliminate TREE as a prompting device) for use on other writing assignments. In addition, other procedures for promoting generalization were incorporated throughout training: students were asked to share what they were learning with their teachers, the resource room teacher was asked to initial all training materials, students were directed to be prepared to use what they were learning in other settings, and each student kept a writing folder with copies of all training materials and compositions written.

Data Collection

Before the experiment began, the instructor received training in administering writing probes, the social validation questionnaires, and the self-efficacy measure. Practice was also provided in scoring pre-writing time, number of words, and self-efficacy. Essay elements and coherence as well as story grammar scores were independently calculated by a trained examiner. Subjective quality ratings of essays and stories were obtained at the conclusion of the study.

Essay Elements. All essays were divided into the following minimal parsable units: premise, reasons, conclusions, elaborations, and nonfunctional (see Scardamelia, Bereiter, & Goleman, 1982). Premise, reasons, conclusions, and elaborations were classified as functional text; i.e., they directly supported the development of the argument. Premise represented the writer's statement of belief. To be scored as a premise, the writer's stated belief had to be clear without having to reference the original essay prompt. Reasons were explanations as to why the writer believed a particular premise. Conclusion was defined as a closing statement (e.g., a statement that brings everything together). In addition, text could be scored as an elaboration on a premise, reasons (e.g., an example), or conclusion. Finally, nonfunctional text was any unit that was repeated but had no discernible rhetorical purpose or any unit that was unrelated to the argument under consideration. This category, therefore, included repetitious information or information tangential to the argument.

Coherence. Based on the scoring procedures developed by Scardamalia et al. (1982), all essays received a score for the longest number of functional essay elements that were included in one of the following coherent ordering of units: 1) premise followed by reasons with elaborations following the initial statement to which they were related (e.g., premise, elaboration on premise, reason 1, reason 2, elaboration on reason 2, etc.) or 2) premise followed by reasons with elaborations in parallel with the initial statements to which they were related (e.g., reason 1, reason 2, elaboration on reason 1, elaboration on reason 2, etc.). Any departure from these patterns was treated as a break in the coherent string. Contrary to the scoring procedures for essay elements, a premise that could not stand alone (simply stating "No" or "Yes" to the essay question) was counted as functional units.

Number of words written. All essays and stories were scored in terms of number of words written. Total number of words included all written words, regardless of spelling, which represented a spoken word.

Pre-writing time. All essays (except generalization probes) received a score for pre-writing time. This was the amount of time between the end of the instructor's directions to write and the actual start of writing by the student.

Story grammar elements. A scale for assessing the schematic structure of stories developed by Graham and Harris (1987b) was used to score all stories. The scale assessed the inclusion and quality of eight story grammar elements identified by Stein and Glenn (1979): main character, locale, time, starter event, goal, action, ending, and reaction. For each element, a score of zero was assigned if the element was not present, while a score of one was assigned if the element was included. Highly developed elements received a score of two.

For the story element goal, a third point was awarded if two or more goals were present. Similarly, for the story element, action, a third or fourth point were assigned if the actions or events happened in a logical manner and/or if there was more than one well-defined episode. By totaling the scores for the individual elements, a total story grammar element score was calculated (19 possible points).

Quality ratings. Essays and stories were scored separately using a holistic rating scale following procedures recommended by Graham (1982). Prior to scoring, all identifying information was removed, spelling and punctuation errors were corrected, and the composition was typed. This provided a control for a number of possible confounding variables (see Graham, 1982).

For both essays and stories, two undergraduate students who were unfamiliar with the design and purpose of the study independently scored the essays. They were told to read each paper attentively but not laboriously in order to obtain a general impression of quality. Papers were scored on a 1 to 8 point scale, with a 1 representing the lowest quality of writing and 8 representing the highest quality. Examiners were provided with a representative sample of a low, medium, and high scoring essay and story to use as guides or anchor points. For each paper, the scores of the two examiners were averaged.

Self-Efficacy. A scale for assessing students' self-efficacy of their ability to write an essay was administered prior to and immediately following training. According to Schunk (1985), self-efficacy refers to personal judgment regarding one's performance capabilities in a specific situation. The scale used in this study was developed in accordance with guidelines described by Bandura and Schunk (1981) and Schunk (1983). The scale ranged from 10 to 100 in 10-unit intervals from not sure (10), to maybe (40), to pretty sure (70), to real sure (100). Five questions were used as stimulus items. The questions measured the respondent's perceived ability to write an essay that had a "good" beginning, that gave three reasons to support the premise, and had a "good" ending. In addition, respondents were questioned concerning their perceived ability to locate errors in their writing and revise their essays so that they were "better." The scale was administered by reading each question aloud; the student was advised to be honest and privately circled an efficacy value on the 10 to 100 point scale. Students were familiarized with the different numerical values on the scale by judging their certainty of successfully jumping progressively longer distances.

Strategy usage. Since the use of the three-step strategy required that the student generate notes in response to the second step, it was possible to obtain evidence on strategy usage by examining the papers students wrote on during their writing probes.

Social validation. At the conclusion of the study, the resource room teacher and the three subjects were interviewed separately to obtain information on perceived effectiveness of the intervention, recommendations, and other feedback. In addition, the resource room teacher was queried regarding evidence on strategy generalization.

Experimental Design

The effects of strategy training on essay writing skills were assessed through the use of a multiple-baseline-across subjects design, with multiple probes in baseline. The following conditions were included:

Baseline. During baseline, pretreatment response rates on essay writing behaviors were established. Throughout baseline, general procedures were in effect.

Training. Training was initiated for the first subject, Elaine, after a stable baseline was established in terms of total number of essay elements. Training was continued until the subject was able to write essays that contained all the basic parts and demonstrated independent mastery of the strategy. Training was not initiated for the second subject, Morgane, until the first subject's post-treatment essay performance reached a criterion level of at least one and a half times the mean number of elements produced during baseline. Identical procedures were followed when introducing and terminating treatment with the third subject, Arthur.

Post-treatment essay probes. Three to four post-treatment essay probes were administered during the first two weeks immediately following the termination of treatment. General procedures were in effect.

Follow-up essay probes. For the first subject, Elaine, three follow-up maintenance writing probes were collected. These occurred at six, eleven, and twelve weeks following the termination of training. For the second subject, Morgane, one follow-up maintenance probe was collected three weeks following training. General procedures were in effect.

Generalization essay probes. Prior to training and during the post-treatment phase, a generalization writing essay probe was collected from each subject by their teacher in the resource room. Procedures for collecting these probes were identical to baseline conditions.

Generalization story probes. In order to determine if the strategy training procedures resulted in transfer to a different genre, multiple story writing probes were collected during baseline and following the administration of post-treatment essay probes. General procedures were in effect for all generalization story probes.

For two of the subjects, Elaine and Morgane, an additional instructional session was initiated following their first and second generalization story probes, respectively. The instructional session was initiated when it became clear that these two subjects did not demonstrate adequate transfer effects. During the instructional session, each subject received practice in using the mnemonic SPACE (note setting, purpose, action, conclusion, and emotion) instead of TREE in the second step of the strategy (Plan).

Results

Reliability of Measures

At the conclusion of the study, 25% of the essays were randomly selected for rescoring. All identifying information was removed and an examiner unfamiliar with the purpose and design of the study was trained to score the essays. In order to determine interrater reliability, Pearson product-moment reliability coefficients were calculated between the scores assigned by the instructors and independent examiner. Interrater reliabilities were as follows: total number of elements (.89), premise (.77), reasons (.79), conclusion (1.00), elaborations (.83), nonfunctional (.97), coherence (.83), and number of words (.99).

Similarly, 29% of stories were randomly selected for rescoring at the end of the study. Identifying information was removed and stories were scored by the examiner who scored the reliability essays. Interrater reliabilities for story grammar elements and number of words was .81 and 1.00, respectively.

The Pearson product-moment correlation coefficients between the quality-rating scores assigned by the two undergraduate students were .77 for essays and .83 for stories.

Essays

Elements. Figure 1 presents the total number of functional elements (premise, reasons, conclusions, and elaborations) for each essay written by each subject during all phases of the study. All subjects evidenced low levels of performance throughout baseline. Elaine, Morgane, and Arthur's mean baseline response rate in terms of total number of functional elements was 2.3, 3.5, and 3.8, respectively. Following training, Elaine's mean performance on the post-treatment essay probes was 7.0, clearly exceeding the previously established baseline level. Average performance on the maintenance probes (5.7) was considerably higher than baseline scores and approximated post-treatment performance. For the second subject, Morgane, mean performance on the post treatment essay probes was 6.25 and she had a score of 7.0 on the maintenance essay administered three weeks following training. The final subject, Arthur, evidenced the largest gains following training; his mean performance on the post-treatment essays was 8.7. Thus, stable baselines were established and the sequential application of the instructional procedures resulted in substantial increases in average number of functional essay elements and these gains were maintained over time.

Insert Figure 1 about here

For all three of the subjects, treatment effects in terms of total number of functional essay elements generalized from the training setting to the students' resource room. Prior to training, the number of functional elements written by Elaine, Morgane, and Arthur when composing in the resource room were 3, 3, and 4, respectively. Following training, all subjects at least doubled their production of functional essay elements on the generalization essays administered in the resource room. Elaine, Morgane, and Arthur's score on this essay was 7, 6, and 8, respectively.

It is also important to examine the distribution of specific essay elements prior to and following treatment. During baseline, 45 percent of all elements were classified as nonfunctional, i.e., material unrelated to the writer's argument and/or the repetition of textual material. Following training, the proportion of nonfunctional elements dropped to 15 percent. In contrast, training resulted in increases for three of the four functional elements. During baseline, 29% of all elements were reasons, while premise and conclusions each accounted for only three percent of the elements. For essays written after training, 41 percent of elements were reasons and premise and conclusions accounted for 11 and 12 percent of all elements, respectively. No changes were noted in the proportion of elaborations; 20 percent of essay elements prior to and following training were elaborations.

The impact of training can also be gauged by examining the proportion of essays written before and after training that contained all of the basic components of an essay: premise, reason, and conclusion. Prior to treatment only seven percent of essays contained all of these elements, while following training 82 percent meet this requirement.

Coherence. The mean coherence scores for Elaine, Morgane, and Arthur on baseline essays were 2.7, 4.0, and 3.2, respectively. For two of the subjects, coherence scores on the post-treatment essays increased substantially; Elaine's average score was 4.7 while Arthur's was 7.0. Furthermore, Elaine's average coherence score on the maintenance probes (6.0) exceeded both her baseline and post-treatment performance. Nonetheless, Morgane did not evidence a sizable increase (over baseline levels) in terms of average post-treatment coherence scores (4.5). She did, however receive a score of 7.0 on the one maintenance probe she completed. Finally, all three of the subjects' generalization essays evidenced higher coherence scores following training. Prior to training, Elaine, Morgane, and Arthur's coherence score on essays written in the resource room were 0, 3, and 4, respectively. On the essay written in the resource room following training, Elaine's coherence score increased to 7, Morgane's to 6, and Arthur's to 8.

It should be pointed out that the observed increases in subjects' coherence scores were clearly related to increases in the number of functional essay elements written by subjects. As a result, it appears that the process by which students included more desirable essay elements did not have a negative affect on the coherence of their writing.

Number of words. The effects of training on the mean length of essays was not consistent across subjects. For Elaine, the mean length of her baseline essays was 40.3. Post-treatment essays, however, were on the average 80 words long, while maintenance essays averaged 93.7 words. Similarly, Arthur's baseline essays averaged 71.6 words and his post-treatment essays increased to an average of 88.8 words. In contrast, Morgane averaged 52 words on her baseline probes, but post-treatment performance dropped to 46 words per essay and she wrote only 43 words on her maintenance probe. All three subjects evidenced an identical pattern on the generalization essay probes collected in the resource room.

Pre-writing time. All subjects averaged less than 12 seconds of pre-writing time on their baseline probes. Following training, average pre-writing time increased for all three subjects. Elaine and Morgane's average pre-writing time on post-treatment essays was approximately eight and nine

minutes, respectively; both spent about six minutes on their maintenance probes. Arthur had approximately eight minutes of pre-writing time on his first post-treatment essay, but pre-writing time on the final two essays was only five and ten seconds, respectively.

Quality ratings. The mean holistic quality ratings for Elaine, Morgane, and Arthur's baseline essays were 2.3, 2.5, and 3.3, respectively. Following the completion of training, mean quality ratings for the post-treatment essays rose to 6.2 for Elaine, 4.0 for Morgane, and 6.0 for Arthur. Improvement in essay quality was maintained over time; Elaine averaged a mean quality score of 5.5 on the maintenance probes, while Morgane received a score of 5.0 on the maintenance probe she completed. Furthermore, in all cases, the generalization probe taken after training received a quality rating three to four-and-a-half points higher than the one taken during baseline.

Stories

Story grammar elements. To determine if the training procedures resulted in transfer effects to a different writing genre, multiple story writing probes were collected during baseline and following the administration of the post-treatment essays. Figure 2 presents subjects' scores on the story grammar scale for each story written during baseline and after treatment.

Insert Figure 2 about here

Elaine, Morgane, and Arthur's mean performance on baseline stories in terms of the story grammar scale was 7.0, 4.0, and 7.3, respectively. With the exception of Arthur's first baseline story, all of the subjects' baseline stories were missing three or more of the basic story grammar elements identified by Stein and Glenn (1979). Following the completion of training and the post-treatment essays, two of the subject's performance on the story grammar scale improved. Morgane's average score (based on the first two stories) increased to 9.5 while Arthur's mean score rose to 12.0. While Arthur's post-training stories contained either all or all but one of the basic story grammar elements, this was not the case for Morgane. Her stories were consistently missing three elements: starter event, ending, and reaction. For the other subject, Elaine, her first story following the completion of training and the post-treatment essays, evidenced a decline in overall performance (story grammar score of 5). In addition, four basic elements were notably missing from her story and it appeared that she attempted, at least in part, to use the mnemonic TREE as an aid in generating story content. Consequently, an additional instructional session was initiated with both Elaine and Morgane; each subject received practice using a mnemonic (SPACE) for generating content related to common story elements. Following this session, Elaine's stories improved dramatically; her average story grammar score was 13.0 and her stories contained all the common elements. While Morgane's performance dropped slightly (8.0), her story contained all but one of the basic parts.

Number of words. Elaine, Morgane, and Arthur's mean length of baseline stories was 40, 61.5, and 97.7. Following the completion of training and the post-treatment essays, all of the subject's stories increased in length; Elaine's first story was 59 words long, while Morgane (based on her first two stories) and Arthur's stories increased to 92.5 and 118 words, respectively.

Following the additional instructional session, Elaine evidenced a dramatic increase in story length ($\bar{X}$ = 151). Morgane, however, produced a story (36 words) that was shorter than any of the other stories that she wrote.

Quality ratings. Elaine, Morgane, and Arthur's mean quality ratings for baseline stories were 1.0, 1.3, and 4.0, respectively. Following the completion of training and post-treatment essays, Arthur's stories evidenced a modest increase to 5.5 in story quality. Elaine's first story, in contrast, did not improve and Morgane's stories improved only slightly to 1.8. Following the additional instructional session, the quality of Elaine's stories ($\bar{X}$ = 5.3) were judged to be much improved, while Morgane's story made a negligible increase to 2.0.

Strategy Usage

Evidence that students used the strategy was obtained by examining any papers students wrote on during the process of writing to determine if the mnemonic TREE was used as an aid in generating notes. Following training, Elaine and Morgane used the mnemonic TREE to help generate notes on all essay probes, including post-treatment, maintenance, and generalization. In contrast, Arthur only made notes for the first post-treatment essay following training. When asked why he had stopped making notes in advance of writing, he replied that, "He didn't need to make a planning sheet because he had the steps in his head." It is important to note that while his prewriting time was much shorter when the mnemonic was not written out in advance of writing, measures of content and quality were only slightly affected.

Two subjects, Elaine and Morgane, were taught to use SPACE in the second step of the strategy. Both used the mnemonic each time they were directed to write a story following instruction.

Self-Efficacy

During baseline, Elaine, Morgane, and Arthur's performance on the self-efficacy measure was 64, 52, and 88, respectively. Following training, Elaine evidenced a small but insignificant four point increase on the self-efficacy measure, while Morgane and Arthur's scores increased by 18 and 12 points, respectively.

Social Validity Interviews

All three of the subjects indicated that they believed the strategy helped them to write better. Comments suggested that the strategy made the task of writing essays easier and provided a helpful device for organizing content. Similarly, all subjects thought that the strategy should be taught to their friends because it would improve their writing. The only negative comments made by the subjects were that the training procedures were "boring sometimes" (one subject) and having to make notes and write the essay was too much (one subject).

The resource room teacher reported that she felt that the instructional procedures had a positive impact on all of the subjects' writing and that she would recommend the use of the strategy with other LD students. She further indicated that two of the subjects had a better understanding that "writing is a

process" and were asking about using the strategy with specific classroom assignments.

Discussion

In the present study, LD students were taught a strategy for planning and writing essays. Multiple methods of assessment were used to evaluate the impact of the self-instructional strategy training procedures. These included an examination of behavioral changes in writing performance following training as well as affective changes in trainees' perceived capabilities, an appraisal to determine if the effects of training were maintained over time and generalized to both a new setting and a different writing genre, collection of evidence on strategy usage, and interviews with the students and their teacher on perceived effectiveness of the intervention.

On the essay writing probes administered during the two weeks immediately following training, all three students participating in the study evidenced substantial gains over baseline levels in several distinct areas of writing performance. First, training resulted in a positive change in the number of functional elements students included in their essays. Essays written after training contained, on the average, approximately two to three times as many, functional elements as those produced during baseline. Second, and equally important, changes occurred in terms of the types of essay elements students included in their compositions. Following training, the proportion of nonfunctional essay elements in students' papers dropped considerably, while the proportion of elements classified as premise, reason, and conclusion increased. The magnitude of change in the construction of students' essays can be gauged by the finding that four out of every five of the papers written after training contained all of the basic parts of an essay; less than ten percent of baseline essays met this same criteria. Third, essays written following training were judged to be qualitatively superior to those written during baseline.

Gains in two other areas of writing performance were also demonstrated by two of the three students. These students' post-treatment essays were, on the average, longer than the papers they composed during baseline. Similarly, these same two students evidenced a substantial increase, following training, in the average length of the longest number of functional essay elements that were coherently ordered. Thus, training in the use of the target strategy allowed these students to not only produce more content (both words and functional elements) but to arrange the generated content in a meaningful and coherent manner.

In addition to improved essay writing performance, two of the students demonstrated a concomitant change in affect following training. They became more confident in their ability to write and revise a "good essay", a measure of self-efficacy. Equally notable was the relatively high score among all of the students on this self-efficacy measure during the pretest ($\bar{X}$=68). The students clearly overestimated their composition abilities. This finding adds to a growing body of literature that indicates that learning disabled students have difficulty accurately assessing/predicting their performance capabilities (Brown, Bransford, Ferrara, & Campione, 1983; Graham & Harris, 1987; Harris, Graham, & Freeman, 1988).

Self-instructional strategy training has been recommended as a particularly promising means for achieving maintenance and generalization (Harris, 1982).

Evidence on the maintenance of training effects was available for two of the students. Both students were able to maintain the gains they had demonstrated immediately following training; there was little difference between their maintenance and post-treatment essays in terms of total number of functional elements and overall quality. Furthermore, their maintenance probes generally had longer coherent strings of functional elements than their post-treatment essays, and one of the students generated more content when writing the maintenance essays.

Two methods were used to assess generalization. First, generalization across settings and persons was assessed by having the students' special education teacher administer in the resource room an essay probe during baseline and immediately following training. For all three students, the generalization essay written after training was superior to the baseline probe in terms of overall quality, total number of functional elements, and coherence. Two of the students also evidence an increase in the amount of content that they generated.

The second procedure for assessing generalization involved having students write stories both before and following the completion of treatment. While students briefly discussed during the course of treatment how the strategy might be used with other writing assignments, direct instruction in adapting the strategy for this purpose was not provided. Thus, students' performance on the story probes provided a procedure for assessing generalization across tasks or more specifically to a different writing genre, narrative stories. Evidence on the transfer effects of training to story writing were mixed. For two of the students, stories written after training were superior to baseline stories in terms of amount of content generated, overall quality, and scores on the story grammar scale. One of these students, however, failed to include several critical story parts, such as how the story ended. Although the third student generated more content on the stories written after training, overall quality was not affected and basic story components were notably absent. Consequently, the two students whose papers were missing basic story elements participated in an additional training session. During this session, they were taught a mnemonic for helping them generate content for each of the basic elements of a story and received practice in using the mnemonic in concert with the other basic steps of the strategy. Following this training session, both students' stories contained all or all but one of the basic story elements. The additional training session also had a powerful effect on the length and quality of one of the students' stories.

Students' actual use of the strategy was assessed by examining any notes they developed during the process of writing. Evidence of strategy usage provides additional confirmation that the instructional manipulations were, in fact, responsible for changes in students' writing behavior. Following training, two of the students demonstrated evidence of strategy usage on every essay they wrote. The third student used the essay mnemonic to generate notes just once following training, but indicate that the strategy had been internalized and, as a result, it was not necessary to make notes in advance of writing. This student's decision not to overtly use the strategy did not have much of an effect on the content or quality of writing. It should also be noted that when students overtly used the strategy there was a correspondingly large increase in the amount of time students spent planning before actually writing their paper.

Finally, both the students and their special education teacher indicated that use of the strategy improved writing performance and that the strategy should be taught to other students. The students suggested that the strategy made the task of writing easier and provided a mechanism for organizing tasks. The teacher reported that two of the students had developed a better understanding of the writing process and were asking about using the strategy with specific classroom assignments.

To summarize, the focus of the present study was to improve LD students writing skills by teaching them a strategy that required them to consider their purpose and their audience, generate notes relevant to the genre under consideration, and to continue the process of content generation and planning during the actual writing of the text. Training was conducted by a preservice teacher in the students' school and intervention guidelines established and refined by clinical and educational researchers (cf., Graham & Harris, 1987c) were adhered to in the design and conduct of the strategy training procedures. The effectiveness of the strategy and the corresponding self-instructional training procedures was clearly demonstrated. Following training, students wrote essays that were judged to be qualitatively better and that generally included all of the components (premise, reasons, and conclusion) central to a complete argument. The amount of material relevant to the writer's paper increased, while content tangential or unrelated to the author's basic premise decreased. Essays were usually longer and the text that students produced was coherently ordered. Use of the strategy by the students was documented and when they used the strategy they were much more likely to spend time in advance of writing generating ideas and notes. Furthermore, the obtained effects were maintained over time and transferred to the students' special education classroom. Associated with the changes in writing performance were changes in students' affect; two of the students became more confident in their ability to write an essay. The students and their teacher reported that the strategy was effective and should be taught to other students. Lastly, some evidence for transfer of training effects to a second genre, story writing, was obtained. Nonetheless, additional modifications and some instruction may be necessary if students are to realize the potential effects of this strategy across different types of writing tasks. For example, the basic steps of having students consider their purpose and audience, generate notes in advance of writing, and continue content generation and planning during text production can be used with a variety of classroom writing tasks. Teachers may find the procedure to be more effective, however, if they provide students with aids or procedures that will help them generate content relevant to the genre under consideration. Just as was done with "TREE" and "SPACE" in the present experiment.

The present study adds to a growing body of literature supporting the use of self-instructional strategy training procedures as an effective means for improving LD students' writing performance and other academic skills (cf. Graham & Harris, in press; Graham et. al., 1988; Pericola & Harris, 1988). Future research needs to document the contributions of specific components of self-instructional strategy training and continue to address issues related to maintenance and generalization (Harris, Wong, & Keogh, 1985).

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Figure 1

Total Number of Functional
Essay Elements

Total Number of Functional Essay Elements

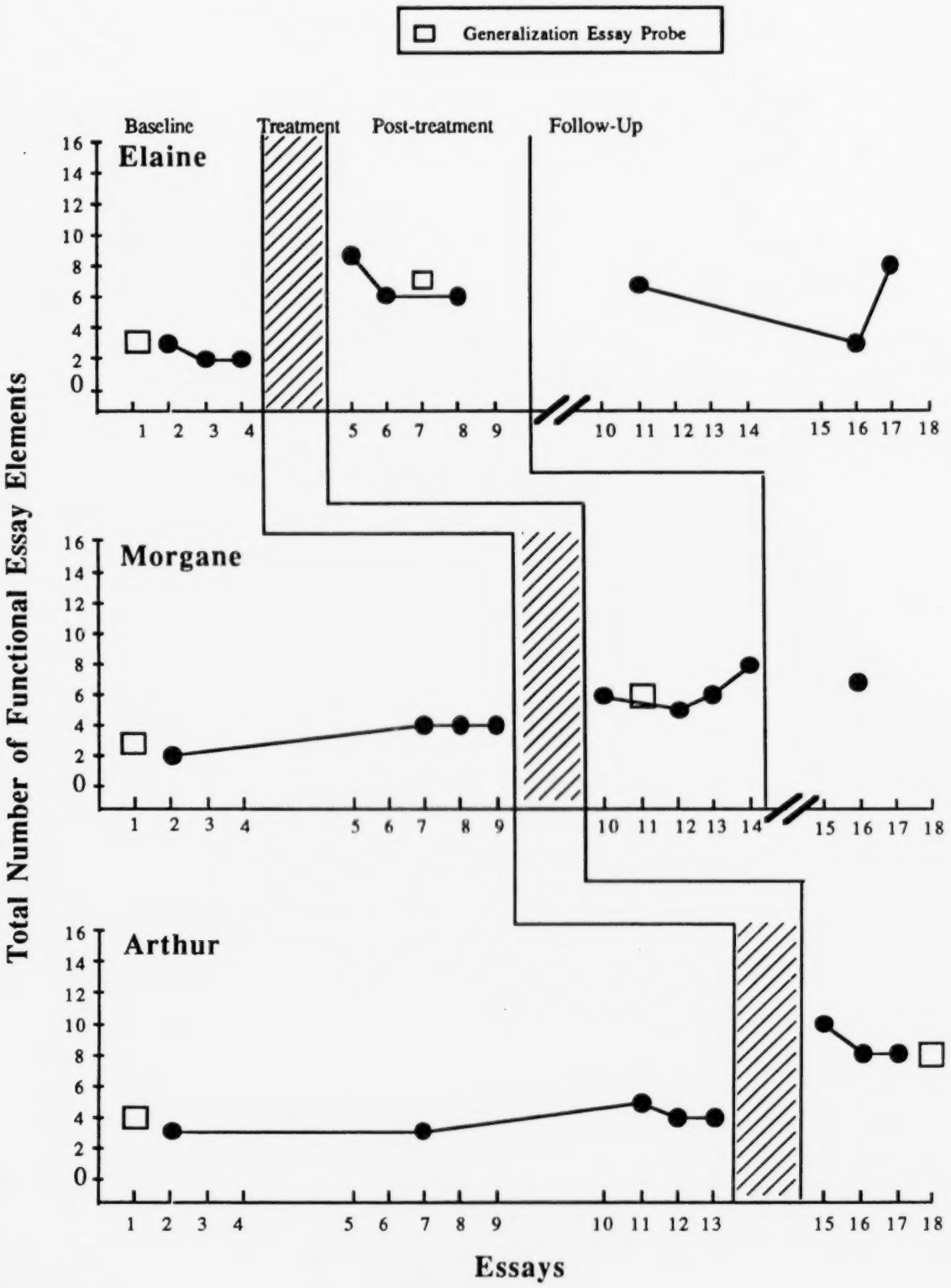

Figure 2

Scores on Story Grammar Scale

Scores on Story Grammar Scale